A FLASHFlux Update

FLASHFlux = Fast Longwave and Shortwave Fluxes with CERES and MODIS Measurements

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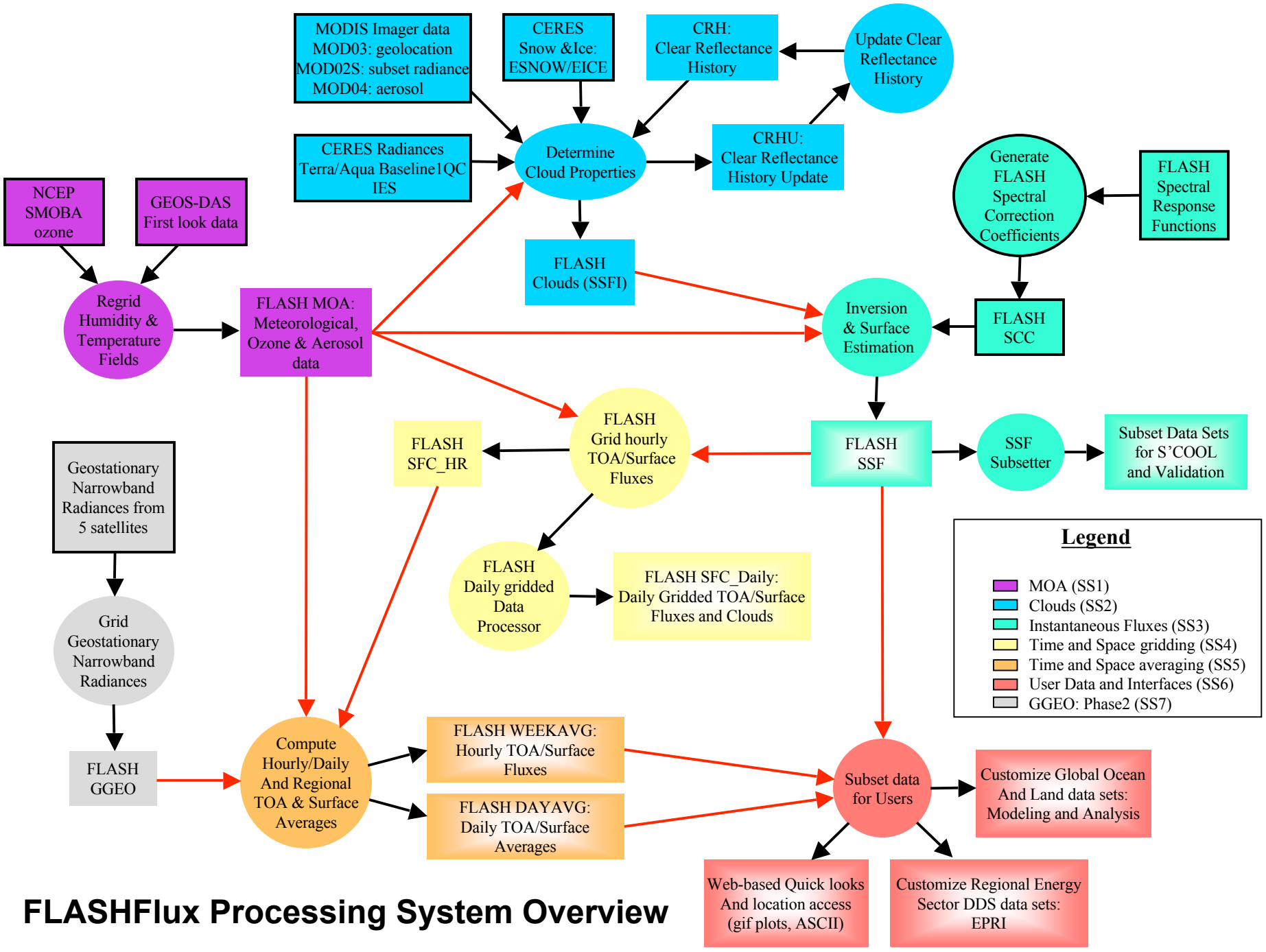
and CERES Team

FLASHFlux Objectives

- **Objectives:**
  - Compute radiative fluxes from CERES observations within one week of measurement (for time averaged data within 1 week of last measurement) => *fill gap between overpass and official climate quality CERES products*
  - Provide these datasets to:
    - ocean (WHOI) & land (GSFC) assimilation teams
    - Instrument teams like CERES, CALIPSO and CloudSat
    - societal applications such as to energy and agriculture sectors
  - Use datasets for scientific evaluation of flux variability and extremes relative to climatological means
- **Requirements:**
  - Design processing system for operational data production within 1 week of observation
  - Design system flexibility to accommodate upgrades of input quantities (i.e., higher resolution reanalysis - GEOS-5, GEO data)
  - System must include data pipelines for dissemination of products to partners and general public.



FLASHFlux Processing System Overview

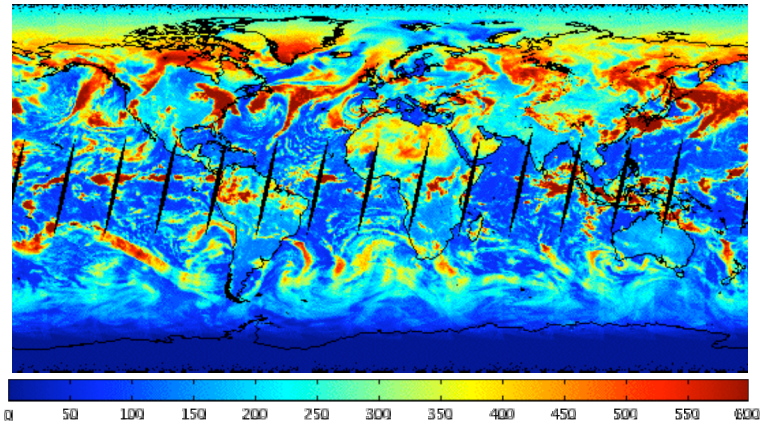
FLASHFlux Status: FLASH SSF

1. **Terra 1B and Aqua1B**
   a. Inversion changed to use LPSA+WCP-55 (SOFA Model B); same version as Terra1B
   b. MODIS Collection 5 Aerosols incorporated
      - Clouds modified to accept MODIS collection 5
      - 1 Channel dropped (3.75 um); 3 added (0.55um, 1.24um, 1.64um)
      - SSF will fill slot for 3.75 w/ missing values; new channels not yet available until new Clouds delivered through CERES
   c. Operational Aqua1B & Terra1B goal May 5, 2006
2. **Spatial Gridding and Time Interpolation**
   a. Delivered to ASDC; in testing
   b. Earliest operational; week of June 1, 2006
   c. Featured product: daily average gridded fluxes
3. **Test Months/Validation processed through TISA**
   a. Mid-seasonal months 10/04, 1/05, 4/05, 7/05
   b. Validation proceeding with CAVE
   c. Intercomparison to CERES where applicable

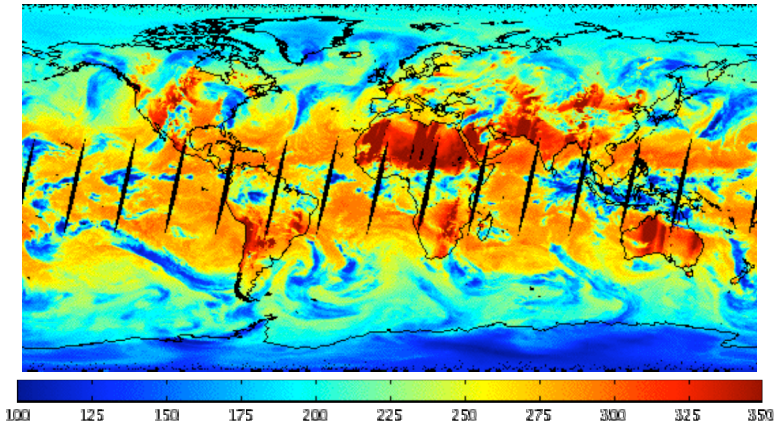
SSF TOA and Surface Fluxes

(Daily Composite Terra Overpass, April 22, 2006)

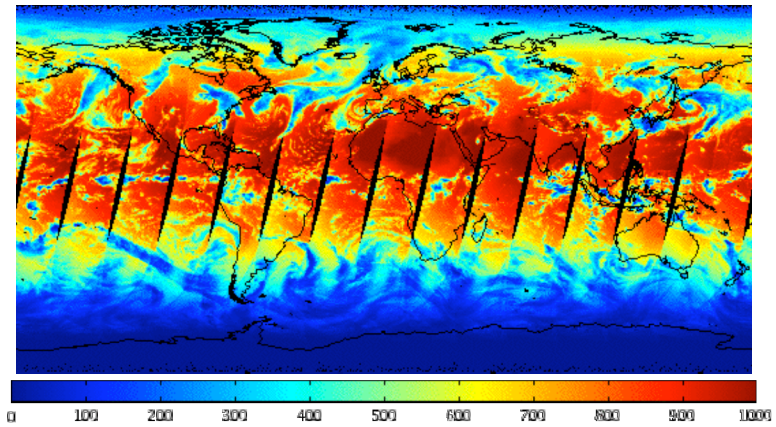
TOA SW Up



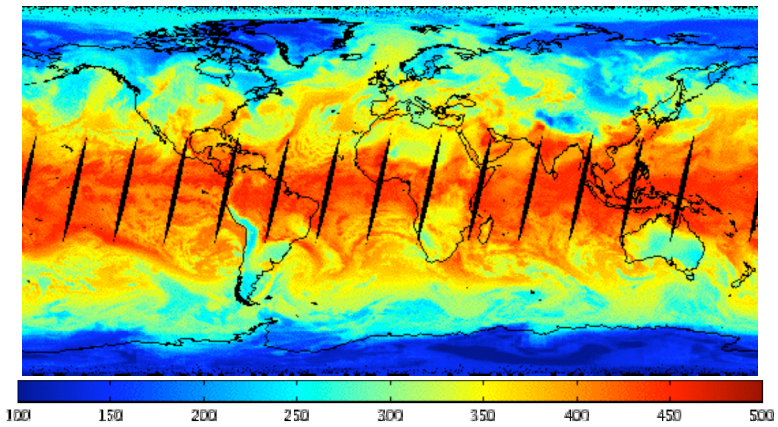
TOA LW Up



Surface SW Down



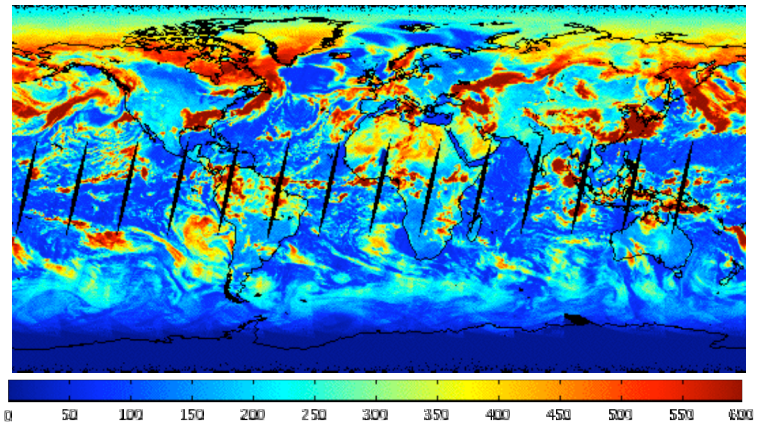
Surface LW Down



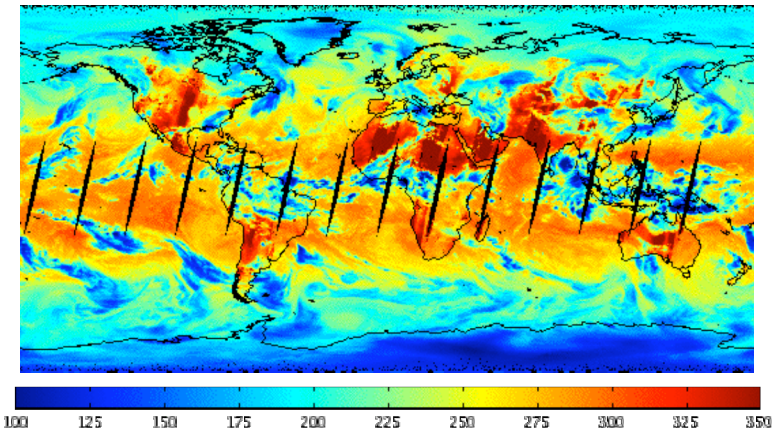
SSF TOA and Surface Fluxes

(Daily Composite Terra Overpass, April 26, 2006)

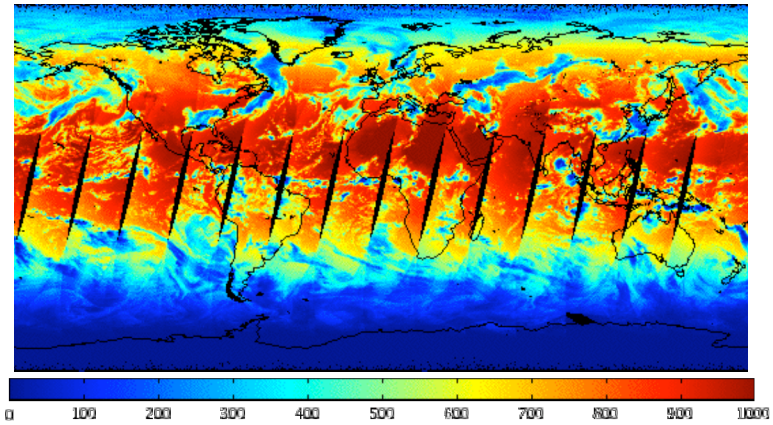
TOA SW Up



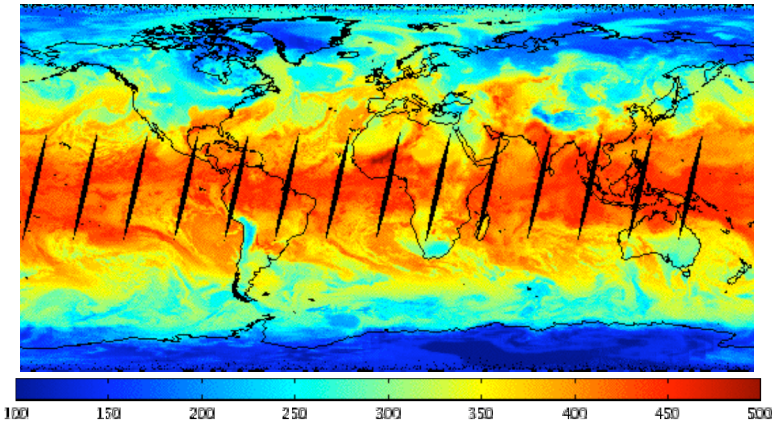
TOA LW Up



Surface SW Down



Surface LW Down



FLASHFlux Data Users

1) CLOUDSAT Operations: Graeme Stephens (CSU), SSF.
2) CERES Groups:
    a. Calibration/Spectral Correction (SSF)
    b. Clouds (SSF): Daily and Monthly QC
    c. S'Cool (SSF): over participating schools
3) Aqua/CALIPSO/CLOUDSAT Fusion: Bruce Wielicki (NASA LaRC), SSF (maybe?).
4) Seasonal Predictions: Randy Koster (GSFC - NSIPP), 3-hourly data.
5) Ocean Assimilation: Bob Weller (Woods Hole), Daily data.
6) Agriculture: Ted Wilson (TAMU-Beaumont), Jim Jones (UF), Gerritt Hoogenboom (UG), Daytime Average Irradiance.
7) Support for field campaigns: Marty Mlynczak & Dave Kratz (NASA LaRC), SSF footprint data for FIRST balloon flight of 6/7/2005.

Conclusions

- Terra1B and Aqua1B SSF: Clouds and Inversion updated to accept MODIS Collection 5 aerosols and LPSA+WCP-55 model; release imminent
- SSF and other products already being used by: FIRST validation; CERES Science team; S'Cool; CLOUDSat
- FLASHFlux Daily Averaged Gridded fluxes to be released in June 2006
- New proposal required: interested users?

Backup Slides

FLASHFlux Status: FLASH SSF

1. **Subsystems MOA, Clouds, and Inversion**
   a. MOA uses GMAO GEOS-4 First-Look, snow maps
   b. Clouds: used as delivered by CERES Terra/Aqua (MODIS 4)
   c. Inversion and surface:
      - specialized coefficients for Terra/Aqua calibration and spectral correction; most recent used
      - Includes SOFA algorithms used for surface fluxes
2. **Data Processed to date (FLASH SSF):**

   a. INTEX period August 1-15, 2004

   b. Mid-seasonal months 10/04, 1/05, 4/05, 7/05

   c. Oct. 2005 being processed in near-real time mode; available now in 4 days after overpass
3. **Validation and Assessment of FLASH SSF**
   a. Compared GEOS-4 FL and LL
   b. Global maps of SSF composite averages being evaluated
   c. Instantaneous validation against BSRN/SURFRAD/ARM surface measurements and CERES SSF products

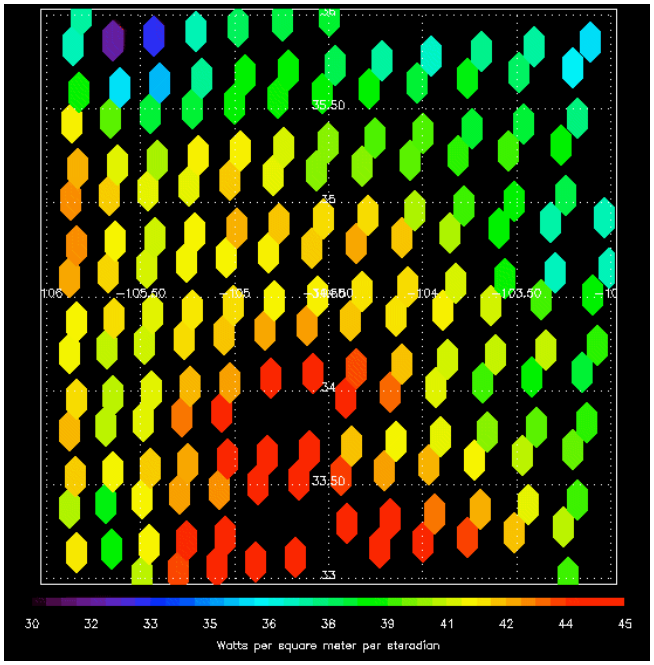
FLASHFlux Status: TISA Products

4. **Spatial Gridding Subsystem**
   a. Terra/Aqua FLASH SSF gridded to 1^{o}x1^{o}
   b. Capability to grid to $1/2^{o}$x$1/2^{o}$ added
   c. Limited processing for testing in June 2004
5. **Temporal Interpolation Subsystem**
   a. ERBE TISA algorithms implemented with flexible processing window; 3-day being test against larger windows
   b. Terra and Aqua processed separately and together
   c. Limited processing for testing in June 2004; limited validation
   d. Main data products: hourly maps (both local and UT) and daily averaged maps
6. **Space and Time Averaged Products for Users**
   a. Designed for user needs
   b. Propose to add weekly and monthly averages; zonal and global

FLASHFlux Field Mission Support: FIRST Validation with AIRS and FLASH-CERES Window Radiance Comparisons

FIRST Balloon Flight (June 7, 2005)

- Four AIRS footprints very close to FIRST
- FLASH-CERES Window channel footprints close to FIRST
- FIRST Radiance at 900 cm^{-1} is 0.15 W m^{-2} sr cm^{-1}
  - Corresponds to a skin temperature of 317.7 K
  - Air temperature at Ft. Sumner ~ 90 F or 305 K
- AIRS skin temperature closest to FIRST is 318.5 K



FLASHFlux SSF

- CERES Window Channel (844 to 1227 cm^{-1})
  - FLASH-CERES measured radiance is 41.66 W m^2 sr^{-1} closest to FIRST
  - Computed radiance using ABQ sonde, 318 K skin Temp is 41.83 W m^2 sr^{-1}
  - Computed radiance for 297 K skin temp is 30.76 W m^{-2} sr^{-1}

Conclude that within 1 K both FLASH-CERES and AIRS support FIRST skin temperature, and hence, absolute calibration of the FIRST instrument

FLASHFlux Conclusions

- FLASHFlux SSF
  - Operational; global fluxes within 4 days
  - 4 Seasonal Months already processed; instantaneous validation on par with CERES-SOFA fluxes
  - Supports S'Cool and CLOUDSAT to date
- FLASHFlux TISA fluxes
  - Global gridded fluxes at 1x1 degree
  - Time Interpolation algorithms being tested and benchmarked
  - Comparison to surface observations and CERES underway
- FLASHFlux Output Products
  - Customized data sets for users being devised
  - Scientific studies of variability to be developed
- FLASHFlux Future
  - GEOS-5 and MODIS-5 to be processed
  - GEO data to be included?
  - 1/2 x 1/2 degree??